

Introduction to Mixed-Integer Linear Programming

Class 1: October 10th, 2016

Instructor: E. Camponogara

1.1 GENERAL INFORMATION

- **Course:** Introduction to Mixed-Integer Linear Programming
- **Instructor:**
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1.2 GOALS

Develop modeling and problem-solving abilities in mixed-integer linear optimization with emphasis on piecewise-linear approximation. The specific topics are:

1. introduction to optimization;
2. proxy modeling;
3. fundamentals of mixed-integer linear programming;
4. branch-and-bound and cutting-plane algorithms;
5. piecewise-linear approximation;
6. AMPL modeling language;
7. applications in petroleum science and engineering;
8. introduction to mixed-integer nonlinear programming.

1.3 REFERENCES

- Lawrence Wolsey, *Integer Programming*, Addison-Wesley, 1998.
- Robert J. Vanderbei. *Linear Programming: Foundations and Extensions*, Springer, Second Edition, 2001.
- Christodoulos A. Floudas, *Nonlinear and Mixed-Integer Optimization: Fundamentals and Applications*, 1st Edition, Oxford University Press, 1995.

1.4 CLASS SCHEDULE

Class	Date	Topic
1	Monday	Fundamentals
2		Introduction to modeling
3		Practice session
4		Review of linear programming
5		Introduction to integer programming
6		Practice session
7	Tuesday	Relaxations and bounding
8		Branch-and-bound algorithm
9		Practice Session
10		Valid inequalities
11		Cutting-plane algorithm
12		Practice session
13	Wednesday	Piecewise-linear approximation: one dimensional
14		Piecewise-linear approximation: multidimensional
15		Practice session
16		Gas-lift allocation problem
17		Introduction to MINLP
18		Practice session
19	Friday	Project presentations
20		Project presentations
21		Project presentations
22		Project presentations
23		Project presentations

1.5 GRADING

To be discussed with Prof. Bjarne Foss.